The Concept of BAMBI

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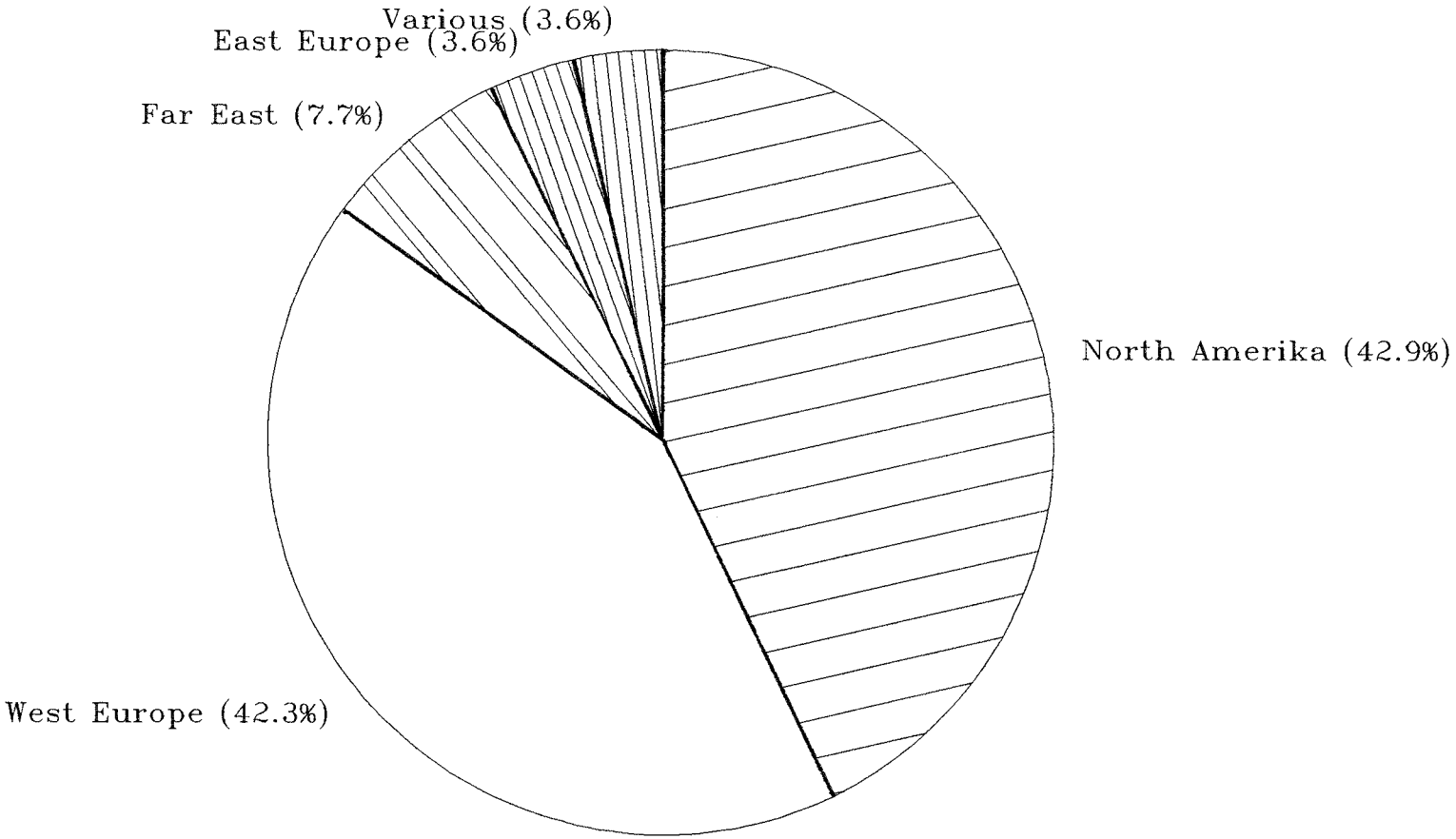
International BAMBI Users

(September 1st, 1978)

North Amerika	72
West Europe	71
Far East	13
East Europe	6
Various	6
TOTAL	168

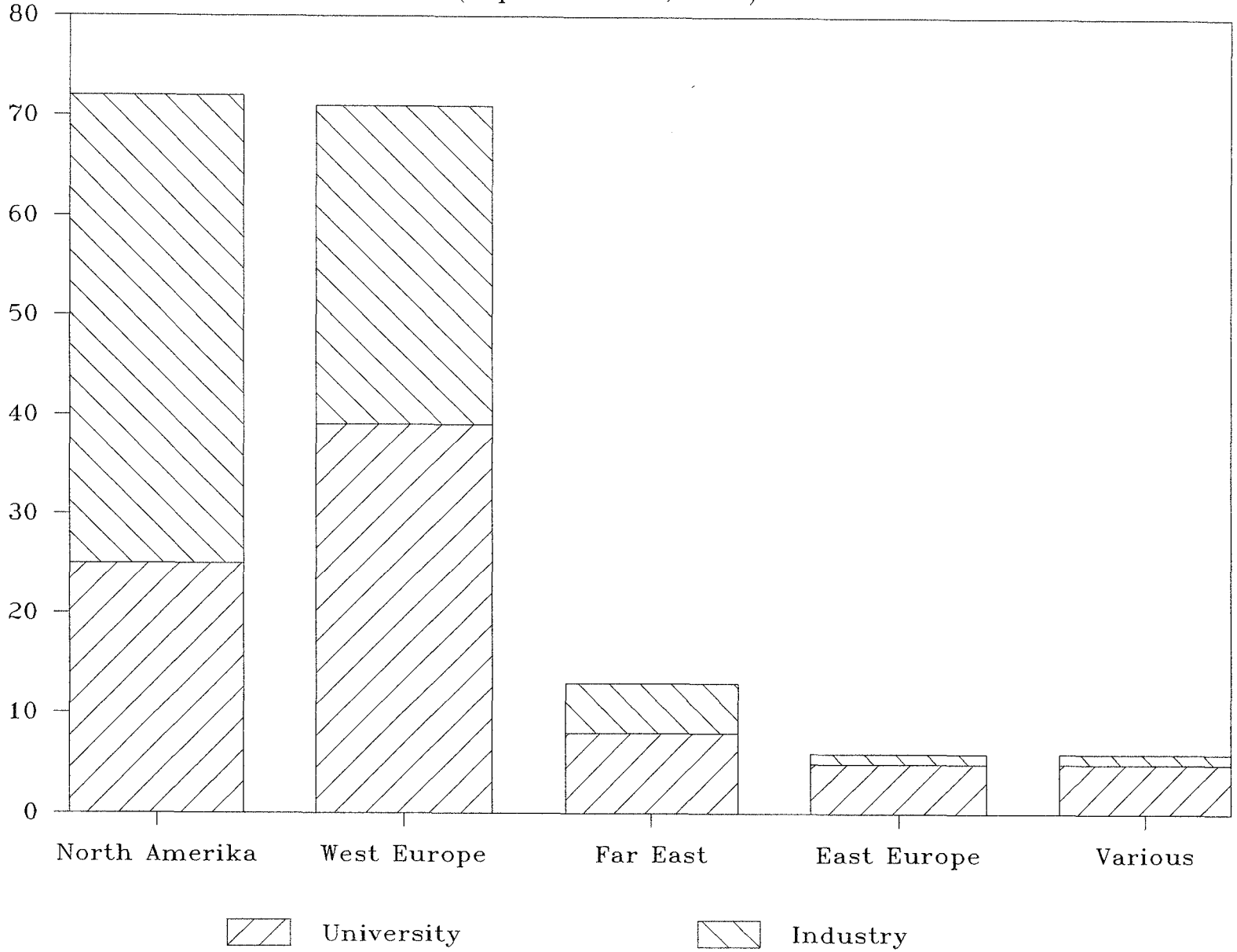
INTERNATIONAL BAMBI USERS

(September 1st, 1987)



INTERNATIONAL BAMBI USERS

(September 1st, 1987)



Goals for BAMBI

- **Flexibility**

  models = physics
  geometry = devices

- **Easy-To-Use**

- **Efficiency**

- **Get-It-Done**

Design Options

- Architecture
- Discretization
- Linearization
- Linear Systems Solver

Design Options

(Architecture)

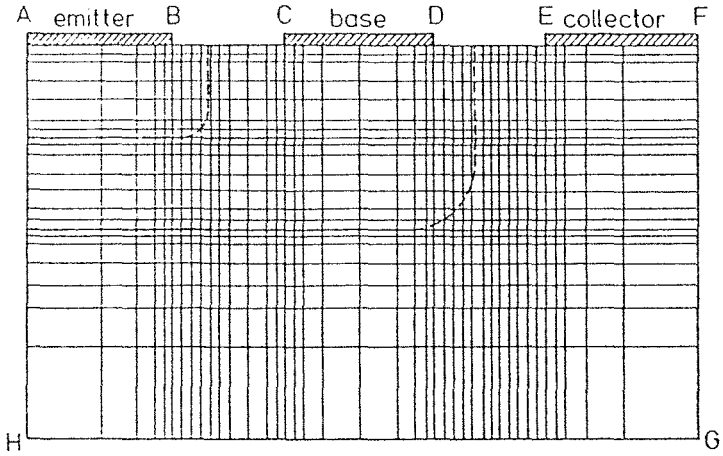
- Interpreter?
- Compiler?
- Interactive?
- Batch?
- Geometry Interface?
- Model Interface?
- Memory Management?
- Post Processing?

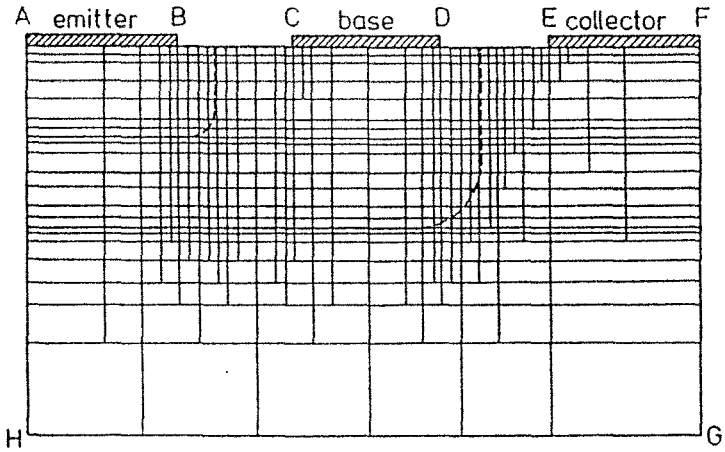
Design Options

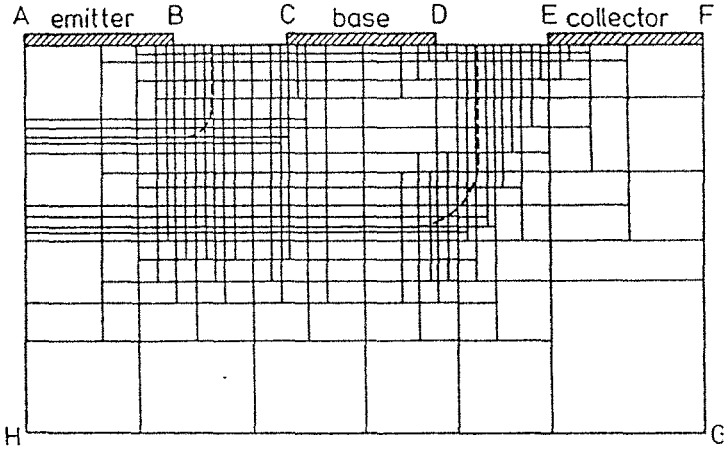
(Discretization)

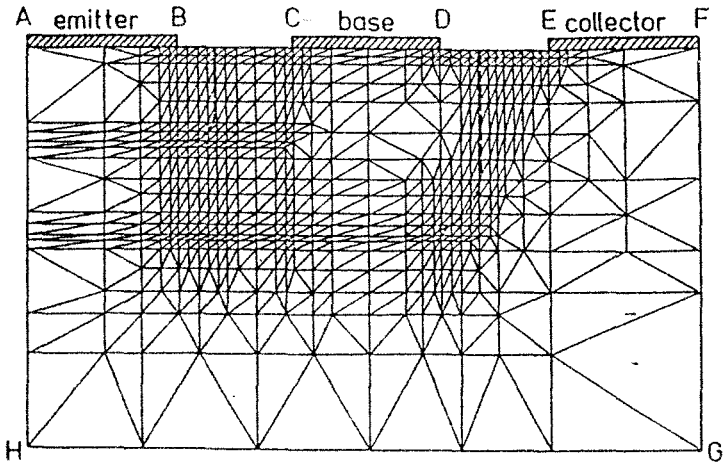
- Finite Differences?
- Terminating Lines?
- Finite Boxes?
- Classical Finite Elements?
- Hybrid Finite Elements?
- Exotic Allmost Finite Elements?
- Boundary Value Methods?

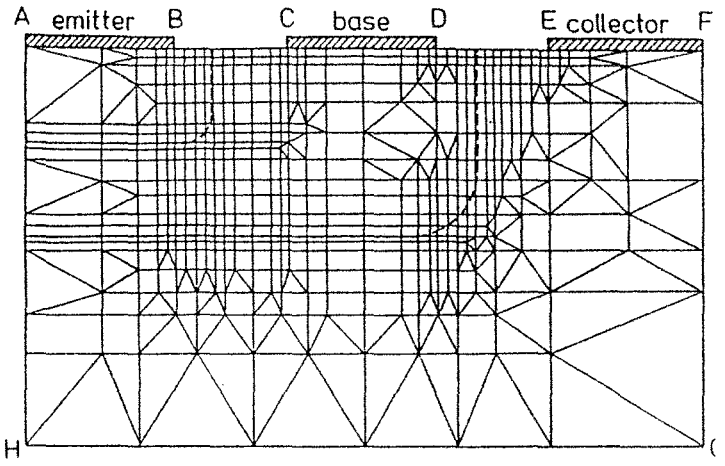
Meshes for a Lateral Bipolar Transistor



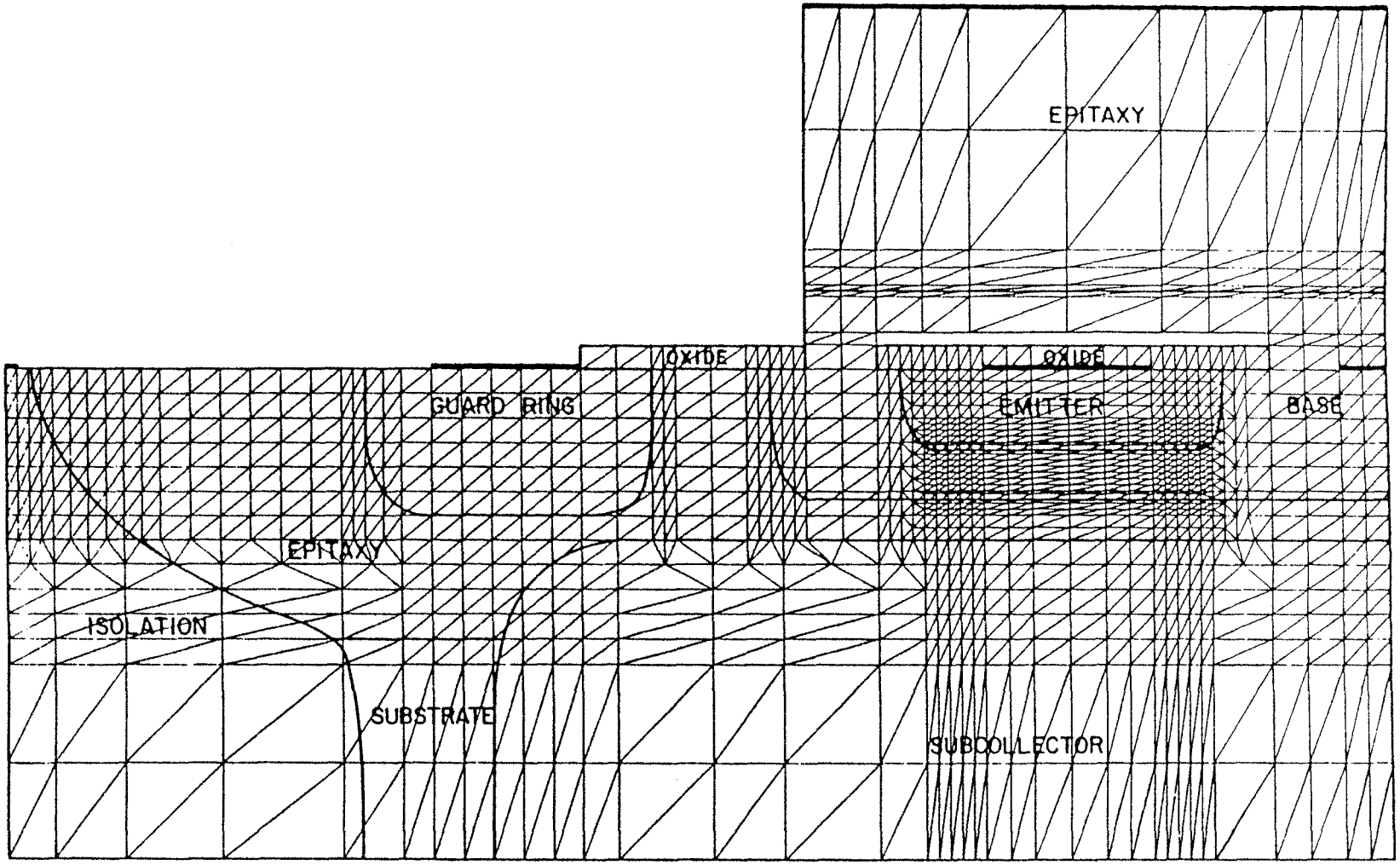








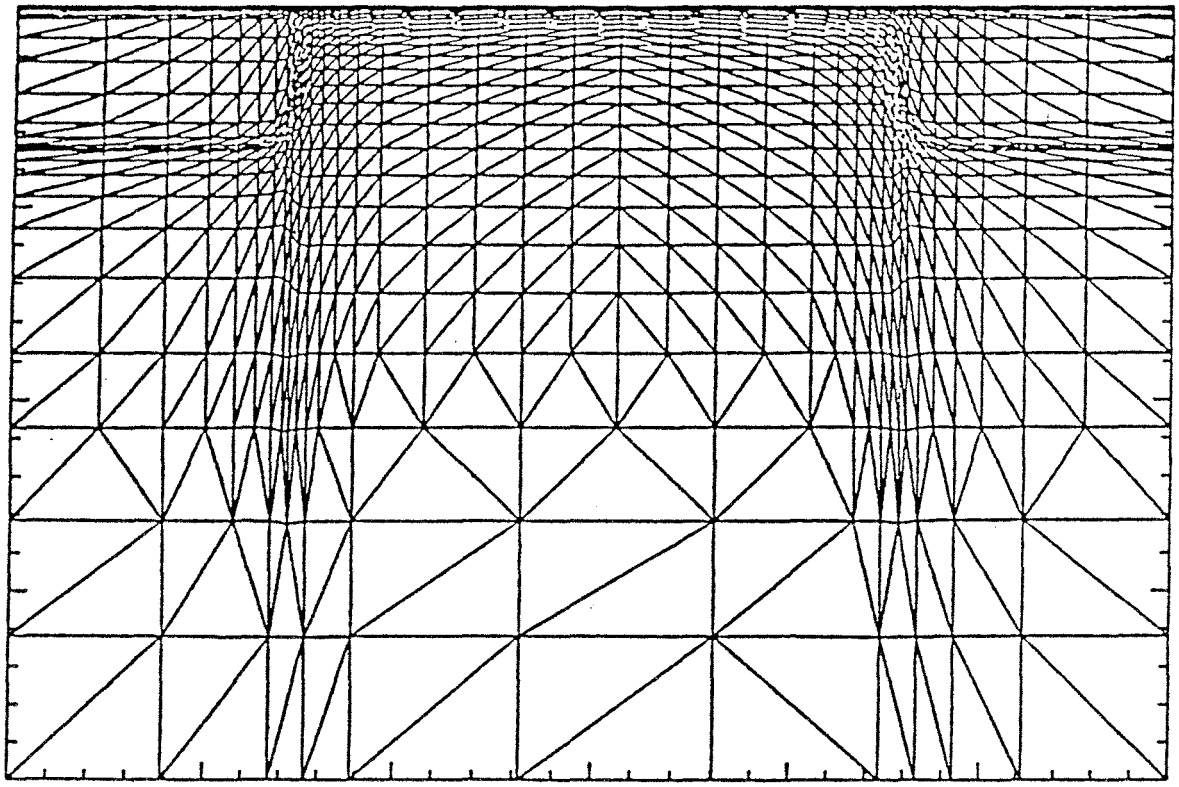
"FIELDAY" Mesh



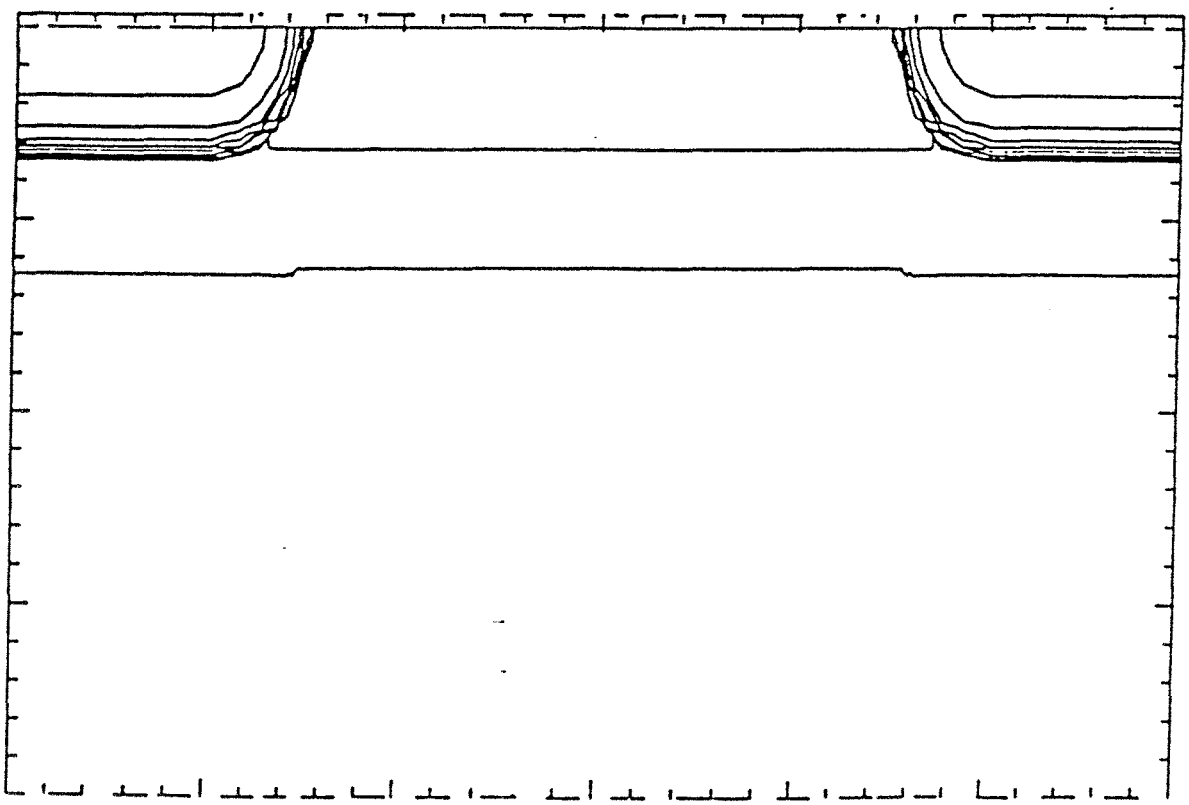
Finite element model of a bipolar transistor.

by : P.E. Cottrell and E.M. Buturla, Proc. NASECODE I

"PISCES" Mesh

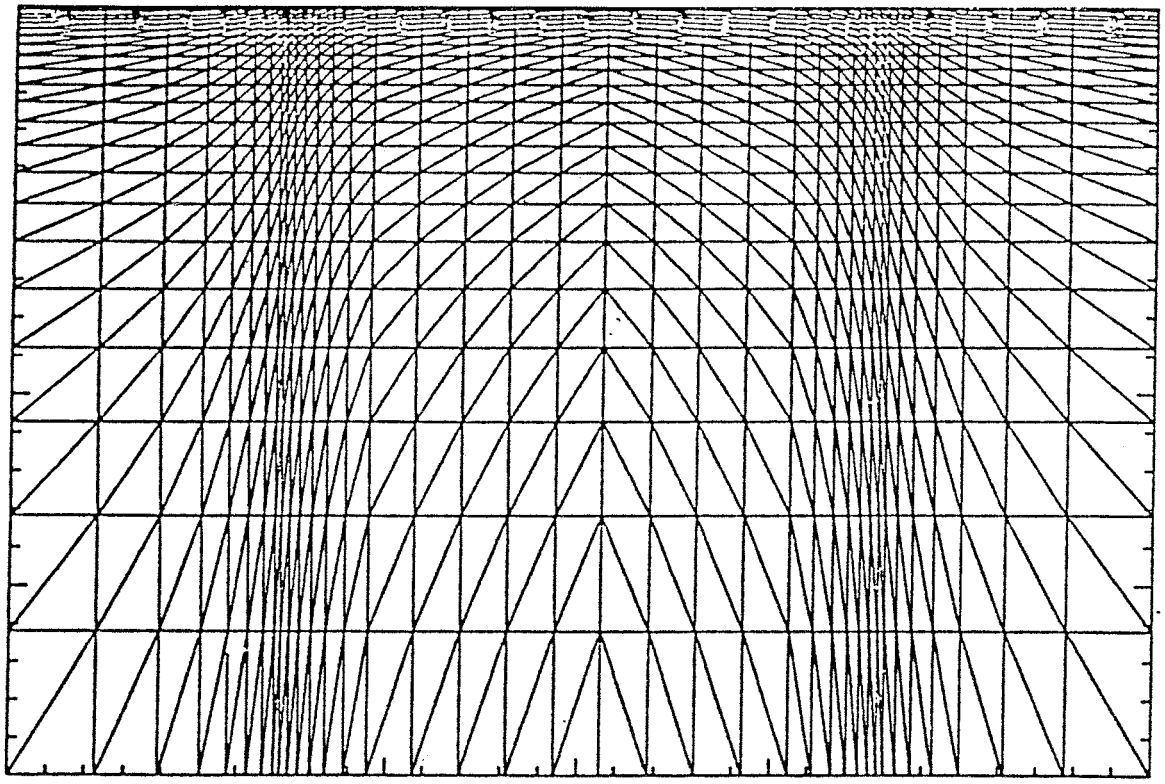


Final grid after distortion (793 points).

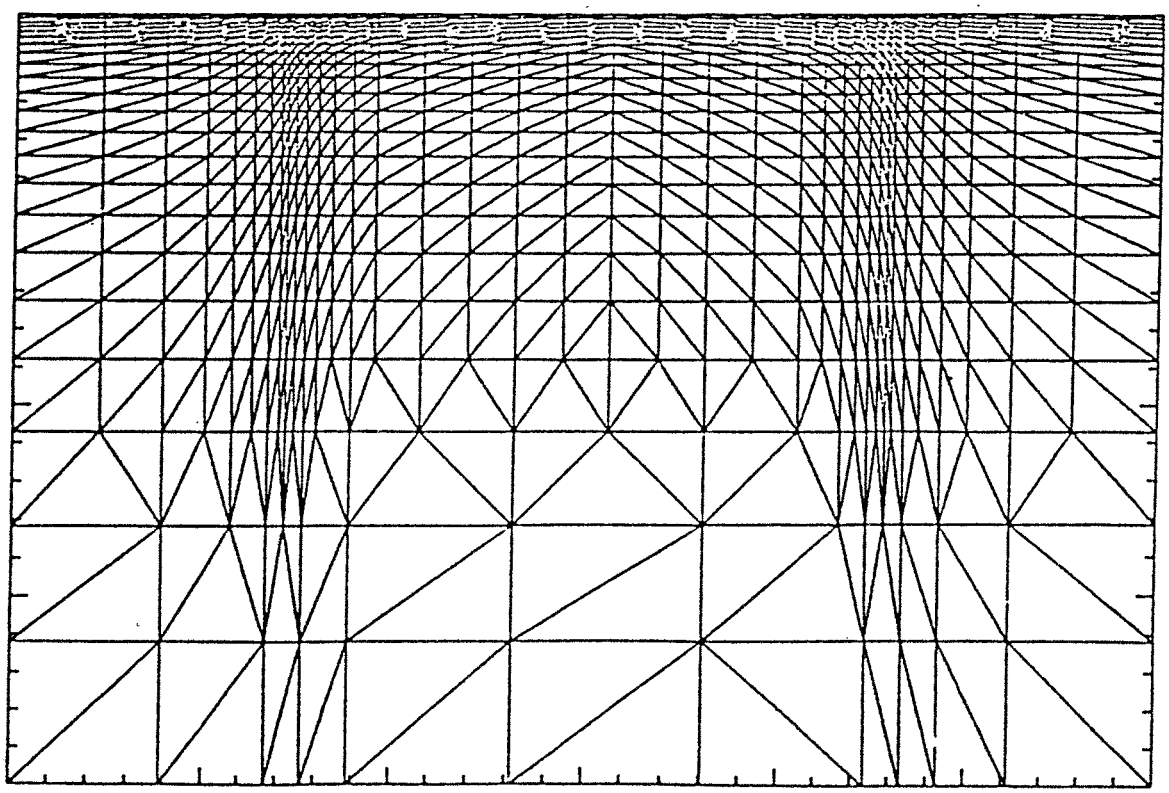


Doping contours for MOSFET.

"PISCES" Mesh

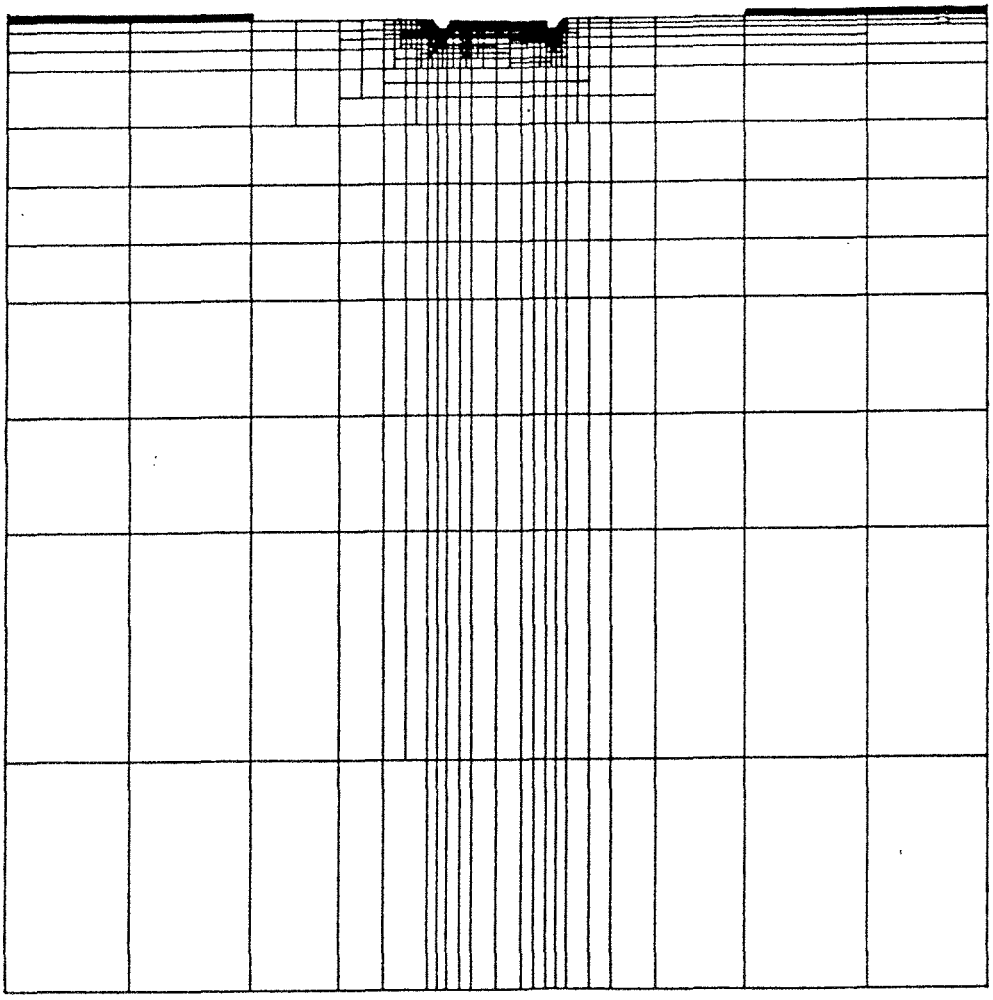


Initial rectangular grid (874 points).



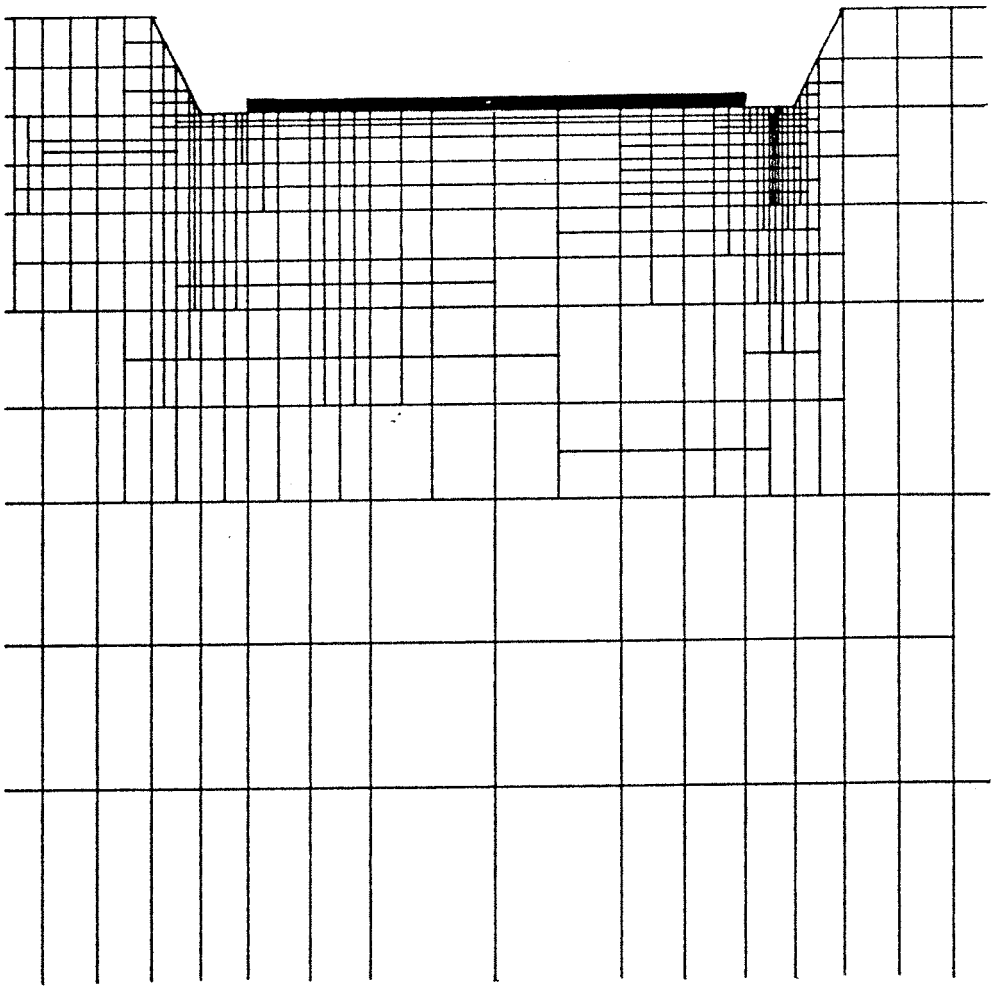
Rectangular grid after eliminate operation (793 points).

Recessed Gate MESFET Mesh



Recessed Gate MESFET Mesh

(Enlarged Detail)



Design Options

(Linearization)

- **Simultaneous Methods?**

  Approximate Jacobian
  Overshoot

- **Block Iterative Methods?**

  Gummels Method
  Relaxation Methods

- **Initial Solution?**

- **Termination Criteria?**

Design Options

(Linear Systems Solver)

- **Factorization Based Methods?**

  Ordering: Bandwidth Based
  Ordering: Envelope Based
  Ordering: Profile Based
  Ordering: Dissection Based
  Ordering: Degree Based

- **Iterative Methods?**

- **Semi Implicit Methods?**

Effort Spent

3 person years by Dr.Gerhard Franz

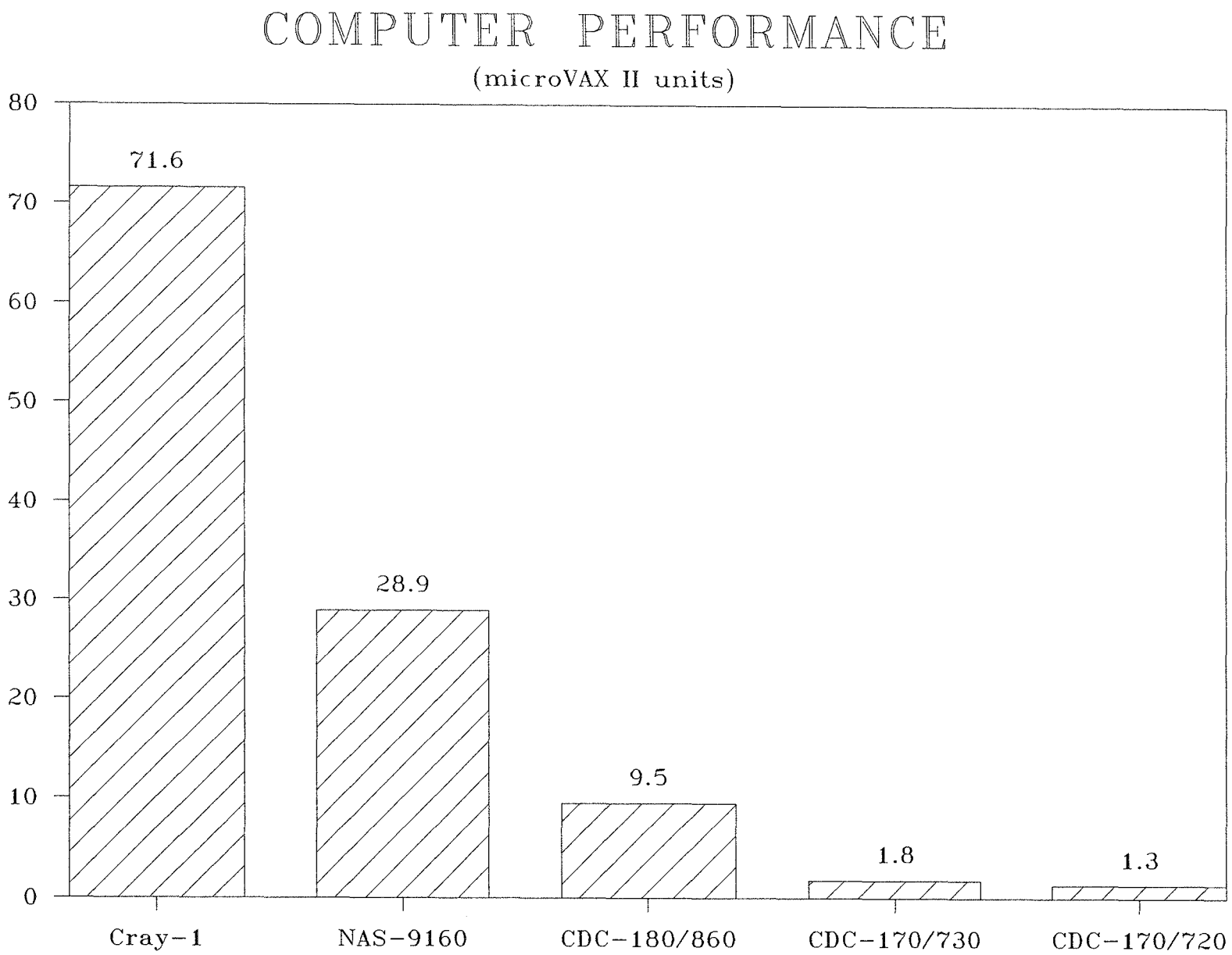
2 person years by Dr.Andrea Franz

2.5 person years by Mr.Wolfgang Kausel

1 person years by Mr.Gerd Nanz

5.5 years elapsed time

4700 MIP-CPU hours


COMPUTER PERFORMANCE
(microVAX II units)
80
70
60
50
40
30
20
10
0
71.6
28.9
9.5
1.8
1.3
Cray-1
NAS-9160
CDC-180/860
CDC-170/730
CDC-170/720

Our Equipment

Donation of DIGITAL	**3μVAX II**
Donation of Ges.F.Mikroelektronik	**1μVAX II**
Donation of SIEMENS (7531)	**0.25μVAX II**
Central Facilities (NAS-AS9160) 7 hours/month, ratio 28.9	**0.28μVAX II**
Central Facilities (CDC-180/860) 10 hours/month, ratio 9.5	**0.13μVAX II**
TOTAL RESOURCES	**4.66μVAX II**

Our Work Will Continue

We Need Constructive Feedback

Our Time Constants Are Long